NOMENCLATURAL CHANGES IN CHIHUAHUAN DESERT *OPUNTIA* (CACTACEAE)

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ABSTRACT

Plant names published in Engelmann's 1848 Letter to Emory are provisional and therefore not valid. These include *O. californica, O. microcarpa, O. stanlyi,* and *O. violacea*. Of these, only *O. californica* was never validated. The remainder were validated by Jackson in Index Kewensis in 1895. The first two names cannot be applied with certainty from the drawings and diagnoses. The last two are predated by *O. emoryi* Engelm. and *O. macrocentra* Engelm. respectively; in neither species do we recognize varieties. Other changes are **O. aureispina** (Brack & Heil) Pinkava & Parfitt, comb. et stat. nov. and **O. ×spinosibacca** Anthony, pro sp., the latter a hybrid between putative parents, *O. aureispina* and *O. phaeacantha* Engelm.

David Hunt (1969) and Nigel Taylor (1985) have questioned the validity of certain cactus names that George Engelmann (1848b) suggested in a letter dated 13 February 1848 to Col. W. H. Emory and published in Appendix No. 2 of Emory's "Notes of a Military Reconnoissance from Ft. Leavenworth, in Missouri, to San Diego, in California."

Based only on J.M. Stanly's drawings of cacti and perhaps the notes of the itinerary, Engelmann provided brief diagnoses for the following opuntias: *Opuntia californica, O. microcarpa, O. stanlyi,* and *O. violacea*. The only other opuntias listed were *O. arborescens* and *O. vaginata*, both validly published earlier by Engelmann (1848a).

Engelmann states in the Letter to Emory (1848b, p. 155) that "I have ventured to describe some of your species from the drawing; my description, however, and the names given by me, must remain doubtful till we are able to obtain some more data to characterize the species. I have written it more for your information than for publication, but if you choose to append it to your published report, I have no objection to it, but must request you to make such corrections or alterations as your notes or your recollection of the plants will enable you to do; for example as to size, as in some of the drawings no size is mentioned,* in which case I have assumed them to represent the natural size." The asterisk refers to a footnote, "*Where the size is not mentioned, the original drawings are the same size of nature. W.H.E.," the only known contribution (correction or addition) by Emory to Engelmann's letter. Taylor (1985, pp. 51–53) comments

SIDA 13(2):125–130. 1988.

that this footnote does not remove "... all earlier expressed doubts about the taxa being named." Further, he states that "... as Engelmann's letter reads, it is difficult to escape the conclusion that his new species were provisional in the sense of ICBN Art. 34.1(b) and their names, therefore, were not validly published in 1848."

We agree with Taylor's conclusion that all names appearing in Engelmann's letter (1848b), but not previously published, are invalid because they are provisional according to ICBN Art.34.1(b) (Voss et al. 1983). Engelmann (1848b) states specifically that "the names given by me must remain doubtful till we are able to obtain some more data to characterize the species."

In subsequent publications, Engelmann never accepted any of these provisional names in *Opuntia*, not even in his "Synopsis" (1856). The provisional names and diagnoses in the letter (Engelmann 1848) are considerably different in style from his earlier and later publications (see, for example, Engelmann 1848a, 1856). Only in the letter are diagnoses in English, not in Latin, and each name appears in his commentary following the brief diagnosis, rather than being placed foremost in the thorough description.

Because several of these names were later validated by Jackson (1895), typification is necessary before the names can be accurately placed. There is evidence that Engelmann never saw Emory's specimens. Not only did Engelmann (1848b) state that he described them from drawings, but Emory in his letter of 26 February 1848 to Engelmann (George Engelmann Papers, MO) acknowledges receipt of the descriptions (and necessarily Stanly's drawings because they were published and bear figure numbers assigned by Engelmann). Emory further states that Engelmann's "descriptions are from drawings & not from specimens of the plant itself" and admits that the drawings are "... not sufficiently anatomical." Engelmann could not have received Emory's specimens prior to his descriptions because Emory also states "... I will yet send them."

Correspondence among Emory, Engelmann and Torrey needs further study, but there are a number of letters where Emory states that he is waiting for Torrey to release his specimens to Engelmann and for Engelmann to return the drawings and identifications so that he can get them to the printer (J.M. Ricketson, pers. comm.).

Therefore, Stanly's original drawings, the only materials Engelmann used for his new diagnoses, are holotypes. Since these have not yet been found, the published drawings qualify as "authentic material" and would serve as lectotypes. We shall await further search before attempting formal typification.

The status of the four opuntias in question follows:

OPUNTIA CALIFORNICA Engelm. in Emory, Notes Mil. Reconn. 158, fig. 11. 1848; invalid provisional name according to ICBN Art. 34.1(b).—not *O. californica* (Torr. & Gray) Cov., Proc. Biol. Soc. Wash. 13:114. 1899.

Benson (1982), believing *O. californica* Engelm. was valid, erroneously designated the following as "lectotype": " 'Ex Hb. Torrey, *Emory*,' (excluding one label, 'arbuscula, Emory, Nov. 13, 1846,' which belongs with a collection of that species from the lower Gila)" (MO 1797128/2015251!, photo ASU!). However, because Benson never provided or made reference to a previously and effectively published Latin description or diagnosis (ICBN Art. 36.1) he did not validate the name.

Treated as a synonym of *O. acanthocarpa* Engelm. & Bigel. by B.D. Jackson (1895); as a synonym of *O. leptocaulis* DC. by W.T. Marshall (1950); and as a synonym of *O. kleiniae* DC. by Britton and Rose (1919) and var. *tetracantha* (Toumey) W.T. Marshall by L. Benson (1969, 1982).

OPUNTIA MICROCARPA Engelm. [in Emory, Notes Mil. Reconn., 157, fig. 7. 1848, nom. prov.] ex B.D. Jackson, Index Kewensis 2:358. 1895. —[*O. microcarpa* Engelm. in Emory, Notes Mil. Reconn., 157, fig. 7. 1848; invalid provisional name (ICBN Art. 34.1(b)).] TYPE: drawing by Stanly (not found).

Treated as a *bona fide* species growing from Solomonville to Tucson, in Arizona, by Griffiths (1916), but he cited no specimens to document his description. Considered by Benson (1982) as a *nomen dubium* because he believed that no present-day taxon fits the locality and description by Engelmann (1848b).

OPUNTIA EMORYI Engelm., Proc. Amer. Acad. 3:303. 1856. —*Cactus emoryi* Lemaire, Cactees 88. 1868. TYPE: "Arid soil south and west of El Paso, especially between the sand hills and Lake Santa Maria, *Wright, Bigelow*, in Sonora, *Wright*, and on the lower Gila and in the Colorado desert, *Schott*..." (lectotype: no locality, *Bigelow in 1852* (MO, seeds only) and no locality or collector (MO 2015170, seeds only, photo ASU!); two seed specimens selected by Benson (1982)).

[*O. Stanlyi* Engelm. in Emory, Notes Mil. Reconn., 157, fig. 9. 1848; invalid provisional name (ICBN Art. 34.1(b)).]

O. Stanlyi Engelm. [in Emory, Notes Mil. Reconn., 157, fig. 9. 1848, nom. prov.] ex B.D. Jackson, Index Kewensis 2:358. 1895.—*Corynopuntia Stanlyi* Knuth in Backeberg & Knuth, Kaktus-ABC, p. 114. 1935.—*Grusonia stanlyi* (Engelm.) H. Robinson, Phytologia 26:176. 1973. TYPE: drawing by Stanly (not found). TOPOTYPE: NEW MEXICO. HIDALGO CO.: along the Gila River, 3 mi SE of Virden, 23 Apr 1966, *L. Benson 16638* (POM 317489! (2 sheets) designated as "neotype" by Benson (1982), photos ASU!).

Although Benson (1969, 1982) recognized three additional (non-autonym) varieties of *O. stanlyi*, we have not transferred them to *O. emoryi* because we consider them to be distinct from that species.

OPUNTIA MACROCENTRA Engelm., Proc. Amer. Acad. 3:292. 1856. *O. violacea* Engelm. var. *macrocentra* L. Benson, Cacti Arizona, ed. 3:21, 92. 1969. TYPE: sandhills in the Rio Grande bottom near El Paso, *Ch. Wright in 1852* (LECTOTYPE: MO 2015392!, 2015393! designated by Benson (1969), photos ASU!).

[*O. violacea* Engelm. in Emory, Notes Mil. Reconn., 157, fig. 8. 1848; invalid provisional name (ICBN Art. 34.1 (b))]

O. violacea Engelm. [in Emory, Notes Mil. Reconn., 157, fig. 8. 1848, nom. prov.] ex B.D. Jackson, Index Kewensis 2:358. 1895. TYPE: drawing by Stanly (not found). TOPOTYPE: ARIZONA. northeast of Solomon, 22 Apr 1966, *L. Benson 16632* (POM 311337! designated as "neotype" by Benson (1969), photo ASU!).

O. violacea Engelm. var. *castetteri* L. Benson, Cact. & Succ. J. (U.S.) 41(3):125. 1969. TYPE: U.S.A. TEXAS. EL PASO CO.(?): Hueco Mts., S of US hwys 62 and 180 combined, limestone, 4300 ft. elev., 11 Jul 1955, *L. Benson 15433* (HOLOTYPE: POM 284747! (2 sheets), photos ASU!).

Benson (1982) recognized five varieties of *O. violacea*. *Opuntia violacea* var. *macrocentra* becomes a synonym of *O. macrocentra*. We consider two of the varieties distinct at the species level (*O. santa-rita* (Griffiths & Hare) Rose and *O. gosseliniana* Weber). The varieties *violacea* and *castetteri* do not warrant taxonomic recognition.

In our studies of the Chihuahuan Desert opuntias, we find two taxa of Big Bend National Park, Texas, that require nomenclatural changes:

OPUNTIA **aureispina** (Brack & Heil) Pinkava & Parfitt, comb. et stat. nov.—*O. macrocentra* Engelm. var. *aureispina* Brack & Heil in Heil & Brack, Cact. & Succ. J. (U.S.) 60(1):17 – 34. 1988. TYPE: U.S.A. TEXAS. Brewster Co.: near Rio Grande, Big Bend National Park, 15 May 1985, *K. Heil 2191* (HOLOTYPE: San Juan College Herbarium 3777!, photo ASU!).

The drying, spiny fruits and the pattern of dispersed glochids in mid-pad areoles keep this taxon from being part of *O. macrocentra* which has fleshy, spineless fruits and a pattern of densely tufted glochids in mid-pad areoles. It is best treated as a species with some affinities to *O. chisosensis* (Anthony) Ferguson. Barbara Ralston obtained a diploid count of $n = 11$ (1987 unpubl.) for this taxon (*Ralston 150 & Hovy,* SRSC).

OPUNTIA ×**spinosibacca** Anthony, pro sp. (= *O. aureispina* (Brack & Heil) Pinkava & Parfitt ×*O. phaeacantha* Engelm.) *O. spinosibacca* Anthony, Amer. Midl. Nat. 55(1):225 – 256. 1956.—*O. phaeacantha* Engelm. var. *spinosibacca* (Anthony) L. Benson, Cact. & Succ. J. (U.S.) 41(3):125. 1969. TYPE: U.S.A. TEXAS. Brewster Co.: Boquillas, rocky limestone slopes east of ranger's

quarters, 26 Aug 1948, *M.S. Anthony 236* (HOLOTYPE: MICH; ISOTYPE: US 2346076!, photo ASU!).

The putative parents are diploid ($2n = 22$) *O. aureispina* and hexaploid ($2n = 66$) *O. phaeacantha*. *Opuntia* ×*spinosibacca* is tetraploid ($2n = 44$) based on counts by Weedin and Powell (1978). The hybrid status of these plants is further substantiated by reduced fertility together with a morphology largely intermediate between the putative parents (including the spiny, yet fleshy, fruit).

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REFERENCES

BENSON, L. 1969. The cacti of Arizona, ed. 3. Univ. of Arizona Press, Tucson.

_____. 1982. The cacti of the United States and Canada. Stanford Univ. Press, Stanford California.

BRITTON, N.L. and J.N. ROSE. 1919. The Cactaceae, vol. 1. Publ. Carnegie Inst. Washington 248 p.

ENGELMANN, G. 1848a. Botanical appendix, p. 87 – 115. *In* A. Wislizenus. Memoir of a tour to northern Mexico, connected with Col. Doniphan's Expedition in 1846 and 1847. U.S. Senate Misc. 26. Reprinted by Rio Grande Press, Glorieta, N.M.

_____. 1848b. Letter to Col. W.H. Emory, p. 155 – 158 + figs. 1 – 14. *In* W.H. Emory, Notes of a military reconnaissance from Fort Leavenworth, in Missouri, to San Diego, in California. Appendix No. 2. Exec. Doc. 41, Senate Doc. 7, U.S. Gov't. Printing Office, Washington, D.C.

_____. 1856. Synopsis of the Cactaceae of the territory of the United States and adjacent regions. Proc. Amer. Acad. 3:259 – 346.

GRIFFITHS, D. 1916. Additional species of *Opuntia*. Bull. Torrey Bot. Club 43:523 – 531 + plate 30.

HUNT, D.R. 1969. Review of *Mammillaria* names in current usage (Part 13). J. Mammillaria Soc. 9:38 – 40.

JACKSON, B.D. 1895. Index kewensis. Vol. II. Oxford at Clarendon Press.

MARSHALL, W.T. 1950. Arizona's cactuses. Sci. Bull. No. 1. Desert Bot. Gard., Phoenix, Arizona.

TAYLOR, N.P. 1985. The genus *Echinocereus*. Royal Bot. Gard., Kew; Timber Press, Portland, Oregon.

VOSS, E.G., et al. (eds.) 1983. International code of botanical nomenclature. Regnum Veg. 111:1-472.

WEEDIN, J.F. and A.M. POWELL. 1978. Chromosome numbers in Chihuahuan Desert Cactaceae. Trans-Pecos Texas. Amer. J. Bot. 65(5):531–537.